ENVS216

The Atmospheric Environment

S1 Day 2019

Dept of Environmental Sciences

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
ENVE117 or ENVS117 or GEOS117 or GEOS112 or 3cp in PHYS units at 100 level

Corequisites

Co-badged status
ENVS616

Unit description
This unit provides an introduction to the major atmospheric, oceanic and other environmental processes that are responsible for our weather and climate. The unit builds on themes introduced in ENVS117 and GEOS112 with a focus on Australian region weather and climate. Severe weather events such as tropical cyclones, thunderstorms, hail and tornadoes are discussed.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Understand the fundamantal principles on which meteorology and climatology are based

Understand the important meteorological and oceanic processes which shape weather and climate

Recall and appropriately utilise meteorological and climatological terminology

Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

Recognise and appropriately utilise basic equations which govern weather and climate

Conceptualise and apply simple models related to weather and climate processes

Apply basic concepts and equations to practical (real world) problems

Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)

Acquire skills in computational analysis of multidimensional weather and climate data

Understand the methods and uncertainties associated with weather forecasting

General Assessment Information

Deadlines, extensions and penalties

Deadlines set for assignment submissions will not be altered except in exceptional circumstances. In all cases, extensions must be applied for before the due date and must be supported with appropriate documentation (medical certificate, counsellor's certificate, statutory declaration). Where an unavoidable disruption warrants an extension, you may also wish to consider applying for Disruption to Studies. Requests for disruption to studies are submitted via ask.mq.edu.au. Instructions on how to submit your disruption to studies request can be found here: http://ask.mq.edu.au/kb.php?record=ce7c4e38-4f82-c4d7-95b1-4e2ee8fd075f

Extensions will not be granted in cases of poor time management. Only the Unit Convenor can authorise extensions. Late submissions will not be accepted once marked assignments have been returned unless otherwise approved by the Unit Convenor.

Late assignments will incur a late penalty of 10% of the total mark per day. Weekends will be counted as 2 days. Penalties will also be incurred for plagiarism, that is, the use of another persons' work and presentation as your own (see University Policies and http://www.mq.edu.au/policy/docs/academic_honesty/policy.html).

Grading

Your assignment will be marked, commented upon and returned to you via Turnitin and Grademark. Grading is conducted in line with the universities grading policy (http://www.mq.edu.au/policy/docs/grading/policy.html)

Assessment Tasks

Name	Weighting	Hurdle	Due
Practical Tasks	20%	No	1 week after practical class
Weather Systems Analysis	20%	No	12th April 5pm
Weather Forecasting	20%	No	24th May 5pm
Examination	40%	No	TBA

Practical Tasks

Due: **1 week after practical class**
Weighting: **20%**

You are required to complete and submit an assessable task for 10 of the practical classes. Instructions for this task will be provided each week in class and via iLearn. Practical tasks contribute a total of 20% towards your final grade, meaning that each task is worth 2%.

On successful completion you will be able to:

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- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
- Acquire skills in computational analysis of multidimensional weather and climate data
- Understand the methods and uncertainties associated with weather forecasting

Weather Systems Analysis

Due: **12th April 5pm**
Weighting: **20%**

You are required to write a consultant style research report on one of eight (8) high impact

weather systems: tropical cyclones, east coast lows, frontal systems, heat-waves, blocking highs, bushfire weather, thunderstorms, or cold outbreaks. Specific instructions will be provided in-class and via iLearn.

On successful completion you will be able to:

- Understand the fundamantal principles on which meteorology and climatology are based
- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Conceptualise and apply simple models related to weather and climate processes
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
- Acquire skills in computational analysis of multidimensional weather and climate data

Weather Forecasting

Due: **24th May 5pm**
Weighting: **20%**

From Week 4 to Week 9 you will be required to participate in the Australian Meteorological and Oceanographic Society (AMOS) Weather Tipping Competition (http://tipping.amos.org.au/dist/pages/index.php#static/home). This is a weather forecasting competition where every Friday you submit a forecast for the weekends weather (temperatures and rainfall) at a specified location. Every Monday the forecasts are evaluated against observations. You will participate in this competition, but instead of just submitting your forecast you are also required to document your reasonings behind the forecasts, and self-evaluation of your forecast skill, based on the concepts learnt from this unit. In Week 11 you will submit a report documenting your participation in the Weather Tipping Contest, and a detailed description of two of your forecasts. Specific instructions will be provided in-class and via iLearn.

On successful completion you will be able to:

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- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems
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Examination

Due: **TBA**
Weighting: **40%**

Exam date, structure, etc., will be available later in the semester. The exam is run through the formal university examination process. The exam structure may take the form of numerical, short answer and/or essay questions. You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in draft form approximately 8 weeks before the commencement of the examinations and in final form approximately 4 weeks before the commencement of the examinations. (http://www.timetables.mq.edu.au/exam) The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. You are advised that it is Macquarie University policy not to set early examinations. All students are expected to ensure that they are available until the end of the teaching semester; that is the final day of the official examination period.

On successful completion you will be able to:

- Understand the fundamantal principles on which meteorology and climatology are based
- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems

Delivery and Resources

The timetable for classes can be found on the University web site at: https://timetables.mq.edu.au/2019/

Lectures

There is 1 x 2-hour lecture each week in 4 Western Road (04WR) 320:

- Wednesday 11:00am - 1:00pm

Attendance is strongly recommended; however, the lecture will be recorded by Echo 360 for

iLecture (links from iLearn).

Practicals

There is 1 x 2-hour compulsory practical each week. Practicals are designed to complement and reinforce concepts learned in lectures, so students are expected to be up-to date with lectures and readings prior to the practical classes. You are required to register for one of the following timeslots:

- Wednesday 9:00am - 11:00am (11 Wallys Wlk 260)
- Wednesday 1:00pm - 3:00pm (11 Wallys Wlk 270)
- Thursday 9:00am - 11:00am (11 Wallys Wlk 270)
- Thursday 11:00am - 1:00pm (11 Wallys Wlk 270)
- Thursday 4:00pm - 6:00pm (11 Wallys Wlk 260)

iLearn

The iLearn platform is central to the delivery of course material, assessments and announcements: http://ilearn.mq.edu.au

Textbook and resources

The primary textbook for ENVS216 is **Aguado, E., and J. E. Burt, 2015: Understanding Weather and Climate (7th global edition, ISBN 978-0-321-98730-3), Pearson, 596 pp**. It is essential for you to obtain a copy of this textbook together with an access card to the Pearson MyLab and Mastering online system (http://www.pearsonmylabandmastering.com/au/). They are sold as a package in the Co-op Bookstore. They are also available online at:

http://www.pearson.com.au/9781488688379

We will also make use of materials from the MasteringMeteorology website to enhance your understanding the textbook, and there are also quiz questions for you to self test your progress.

When we discuss weather systems and climate specific to the Australian region, the useful reference book is Sturman, A., and N. J. Tapper, 2006: The Weather and Climate of Australia and New Zealand (2nd edition), Oxford University Press, 541 pp, which is accessible from the University Library.

Unit Schedule

Week	Date	Lecture title	Practical
1	27-Feb	Introduction to the Atmospheric Environment (SB)	No Practical
2	6-Mar	Atmosphere Composition and Solar Radiation (SB)	Atmosphere and Energy
3	13-Mar	Energy Balance and Temperature (SB)	Radiation and Temperature
4	20-Mar	Atmospheric Pressure and Wind (SB)	Pressure and Wind Weather Tipping Assignment start
First On-Campus Session for external students, 23rd March 2019			
5	27-Mar	Atmospheric Moisture (KC)	Atmospheric Moisture
6	3-Apr	Cloud Development and Forms (KC)	Cloud Formation
7	10-Apr	Precipitation Processes (KC)	Precipitation Processes Weather System Report Due: 5pm 12th April
Session 1 recess: 15th April to 26th April			
8	1-May	General Circulation (SB)	Introduction to Matlab for Atmospheric Science
9	8-May	Air Masses and Fronts (SB)	Weather Maps and Fronts
Second On-Campus Session for external students, 11th May 2019			
10	15-May	Mid-latitude Cyclones (KC)	Mid-latitude Cyclones
11	22-May	Lightning, Thunder and Tornadoes (KC)	Thunderstorms Weather Tipping Assignment Due: 5pm 24th May
12	29-May	Tropical Storms (KC)	Tropical Cyclones
13	5-Jun	Course Summary (SB)	No practical
SB – Dr. Stuart Browning; KC – Dr. Kevin Cheung			

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-centr

al). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
- Acquire skills in computational analysis of multidimensional weather and climate data

Assessment tasks

- Practical Tasks
- Weather Systems Analysis
- Weather Forecasting
- Examination

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
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Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Conceptualise and apply simple models related to weather and climate processes
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Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Understand the fundamantal principles on which meteorology and climatology are based
- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
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Assessment tasks

- Practical Tasks
- Weather Systems Analysis
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- Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Understand the fundamantal principles on which meteorology and climatology are based
- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
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Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Recognise and appropriately utilise basic equations which govern weather and climate
- Conceptualise and apply simple models related to weather and climate processes
- Apply basic concepts and equations to practical (real world) problems
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)
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Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Conceptualise and apply simple models related to weather and climate processes
- Access, evaluate, and analyse a range of categorical and numerical data (e.g., interpreting environmental data)

Assessment tasks

- Practical Tasks
- Weather Systems Analysis
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Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should

have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Apply basic concepts and equations to practical (real world) problems

Assessment tasks

- Practical Tasks
- Weather Systems Analysis
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Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- Understand the important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

Assessment tasks

- Practical Tasks
- Weather Systems Analysis
- Weather Forecasting
- Examination